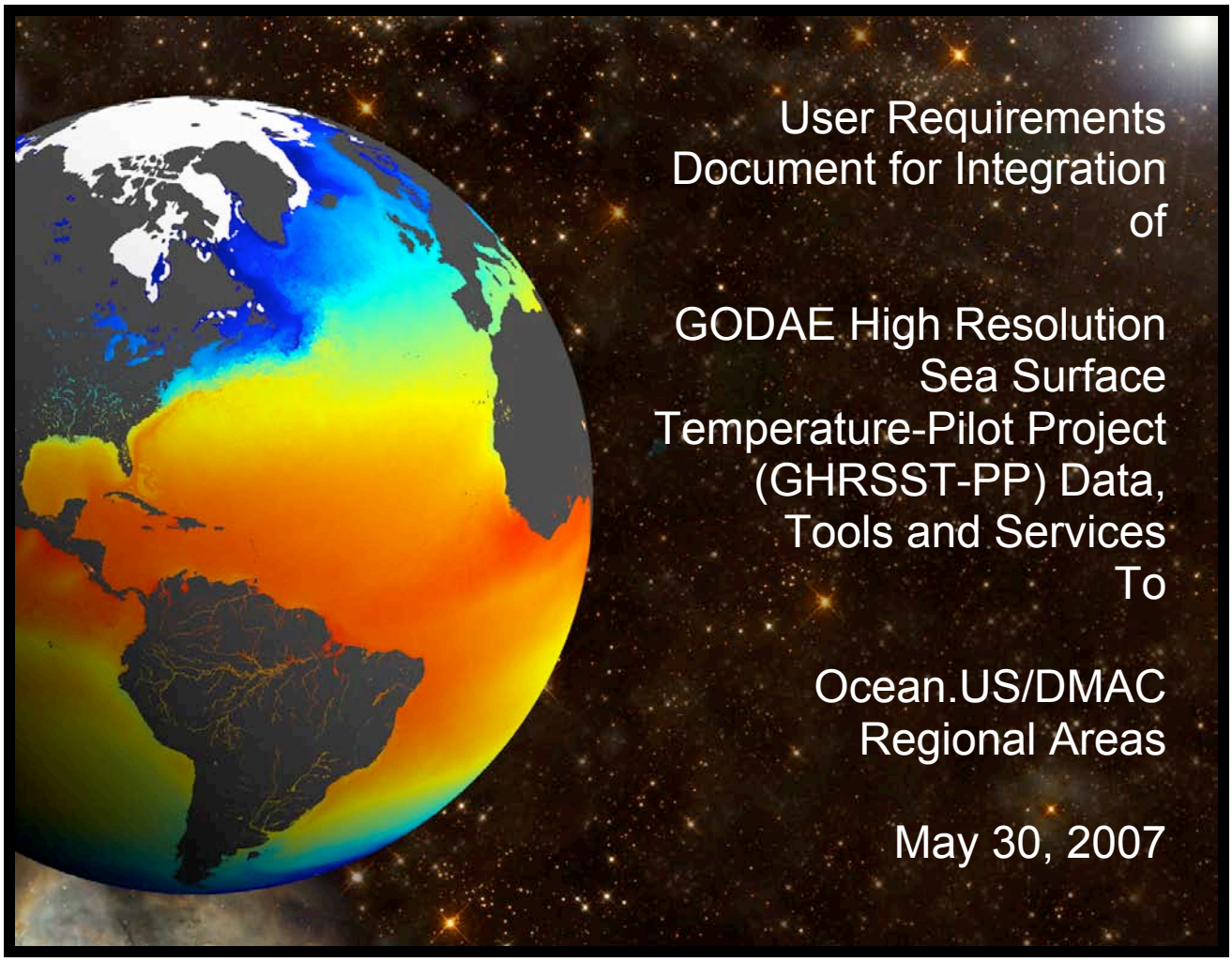

Version 1.0

NASA/DMAC Collaboration Project

Dr. Jorge Vazquez
jv@pacific.jpl.nasa.gov

JPL

Susan Heinz
sheinz@geologics.com

GeoLogics

GHRSST-PP
GODAE High Resolution Sea Surface Temperature Pilot Project

NASA

Document Change Record

Author	Modification	Issue	Date
S. Heinz	Original	V 1.0	5/30/2007

Table of Contents

1.0 Background and Current Status

The NASA Earth Science Systems Program in coordination with the Jet Propulsion Laboratory and GeoLogics Corporation has established a project to collaborate with Ocean.US Data Management and Communication (DMAC) group. The collaboration will facilitate the NASA GHRSST-PP products and standards into the Ocean.US Regional Associations (R.A.'s). The goal of the project is to promote the integration of NASA data products, standards and protocols, for coastal applications and support decision-making processes. The GHRSST-PP is a relevant data model because this project currently incorporates standards for data transport; metadata, format and archiving that are relevant to Ocean.US DMAC subsystem. The GHRSST-PP provides data, tools and services that include high-resolution 1km global data that can be used for coastal and regional applications.

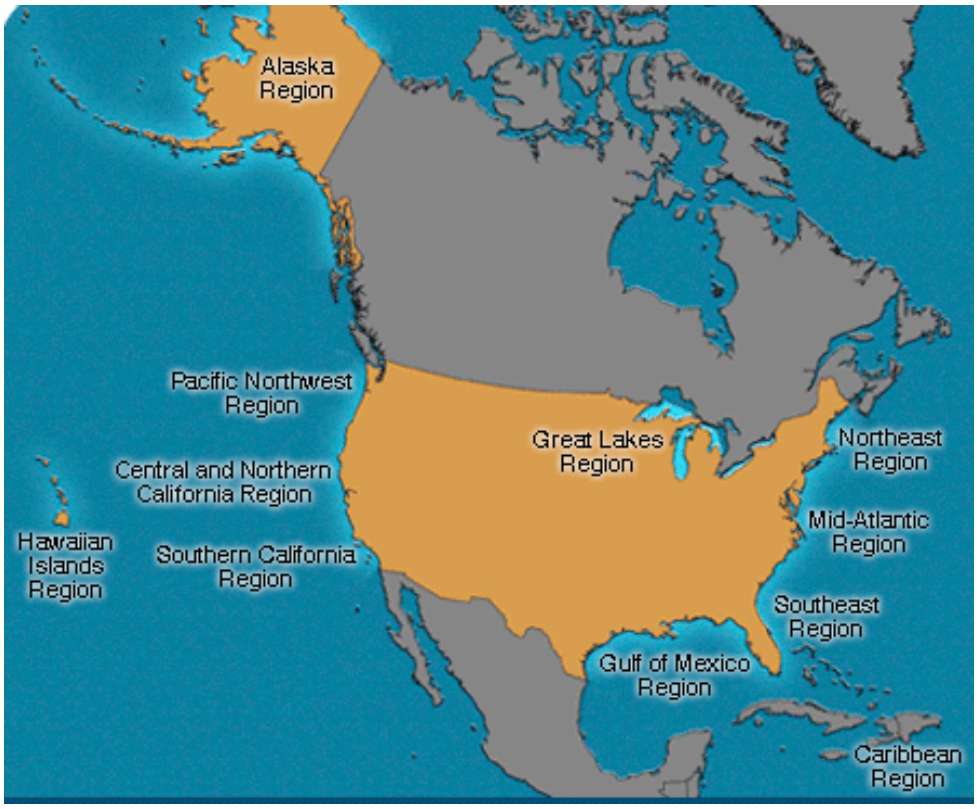

Figure 1: Regional Associations

Additionally, incorporation of all NASA data products with the R.A.'s will be explored, not just the GHRSST-PP. Because of the standards already implemented in the GHRSST-PP, this pilot activity will provide a demonstration of the DMAC backbone standards and protocols. It will provide an opportunity for NASA to interact with the IOOS Regions and a two-way exchange of ideas and techniques.

This User Requirements document is designed to be updated as new user information becomes available during this project. Updates are recorded on the Document Change Record table on page 2.

GHRSST-Pilot Project Background

The GHRSST-PP is currently established to give international focus and coordination to the development of a new generation of global, multi-sensor, and high-resolution near real-time SST products. There is additionally a reanalysis component, which aims to reprocess the multi-sensor SST products to create high quality climate data records. The GHRSST-PP brings together international space agencies, research institutes, universities, and government agencies to collectively address the scientific, logistical and managerial challenges posed by creating the SST data products and services within the Project. In the GHRSST-PP shared processing model, site specific Regional Data Assembly Centers (RDACs) in the United States, Europe, Japan and Australia have the responsibility for producing the standard netCDF formatted level 2 preprocessed (L2P) data products for a wide variety of satellite sensors. Using merging algorithms, high-resolution level 4 multi-sensor products are also produced. The Pilot Project has now implemented a system that will provide a demonstration of the operational advantages and value of including high resolution near real-time SST data sets in climate research and ocean modeling. The Global Data Assembly Center (GDAC) at JPL is tasked with the distribution and management of the GHRSST data products following NASA data standards. Data products may be obtained from the U.S. NASA JPL GDAC at http://ghrsst.jpl.nasa.gov.

A full description of the GHRSST-PP and data availability can be viewed from the GHRSST-PP project web server located at http://www.ghrsst-pp.org

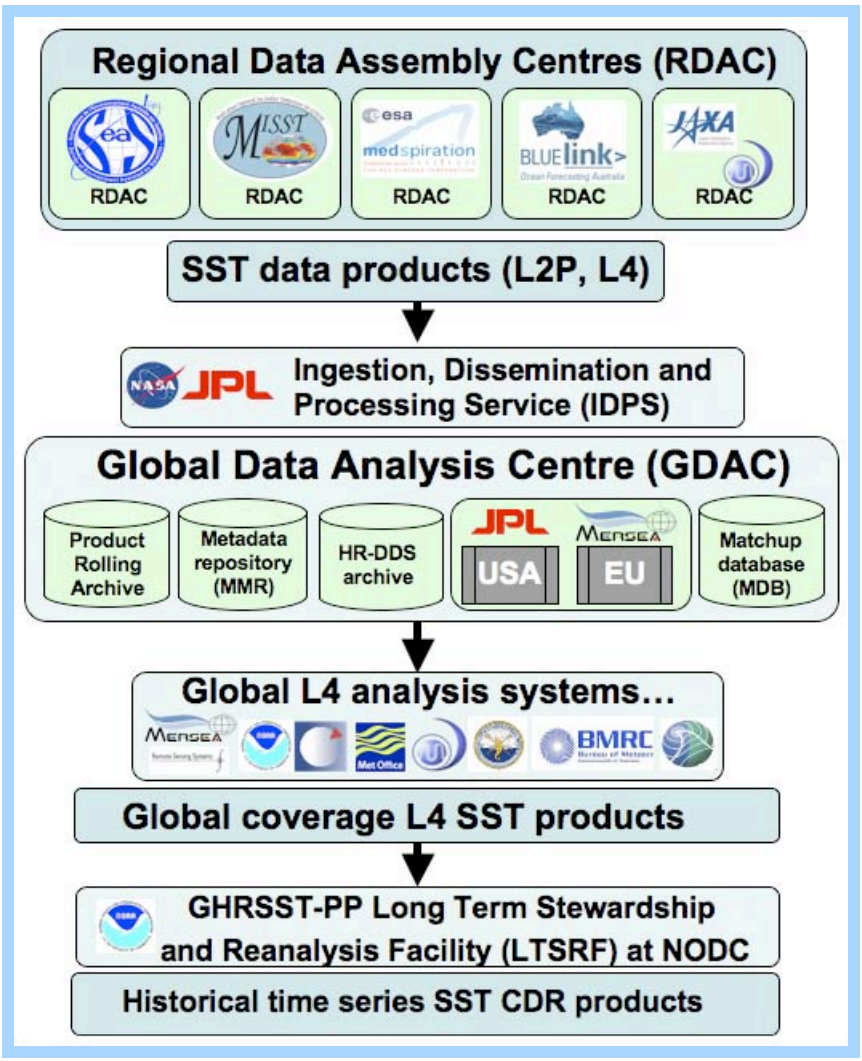

Figure 2: GHRSST-PP Data Management Flow Diagram.

1.1 NASA GDAC User Communities and Requirements

As reported in the GHRSST-PP User Requirements summary (http://www.ghrsst-pp.org), there are three broad categories of Users:

	Spatial Resolution (km)	Delivery Timeliness (hours)		Accuracy (C)
		Target	Threshold	
Coastal Ocean	at least 1	3	6	<0.3K
Open Ocean	5-10	6	12	<0.4K
Ultra-High Resolution	2	3	6	<0.3K

1.2 NASA GDAC Sensors

- AATSR
- AMSR-E
- AVHRR GAC
- AVHRR LAC HRPT
- MODIS Terra
- MODIS Aqua
- GOES 11
- GOES 12
- SEVIRI
- TMI

1.3 GDAC Data Products

L2P Observations
L2P data products provide satellite SST observations together with a measure of uncertainty for each observation in a common netCDF format. Auxiliary fields are also provided for each pixel as dynamic flags to filter and help interpret the SST data. These data are ideal for data assimilation systems or as input to analysis systems. Some REMSS datasets are available as L2P Gridded.

L4 Gridded SST
L4 gridded products are generated by combining complementary satellite and in situ observations within Optimal Interpolation systems. L4 gridded products are provided in GHRSST-PP netCDF format. These data are ideal for model diagnostic studies, model boundary condition specification and model initialization.

Climate Data Records
R-analysis L4 data products are generated by combining delayed mode satellite and in situ observations in an optimal manner within the GHRSST-PP Re-Analysis program (GHRSST-RAN). Great care is taken to ensure that only the highest quality observations are used to generate Climate Data Records (CDR).

High Resolution Diagnostic Data Set (HRDDS)
Diagnostic Data Sets are produced from satellite data every day for a number of globally distributed sites as part of the GHRSST-PP data product monitoring system. In some cases, satellite winds, ocean color, operational NWP and ocean forecast model outputs are also available. These data products are aimed at groups interested in verification of satellite data sets (including L2P and L4 GHRSST-PP products).

Master Metadata Repository
International Standards Based (FGDC, ISO19115, INSPIRE) Metadata records are available as an on-line resource from the GHRSST-PP Master Metadata Repository (MMR) system. The MMR provides a complete catalogue of all GHRSST-PP compliant data sets.

1.4 Summary Table of NASA GDAC Products

Sensor	*Data Product Type*	*Resolution*	*Access*	*RDAC Source*
TMI	L2P		FTP	REMSS
TMI	L2P Gridded		FTP	REMSS
AMSRE	L2P		FTP	REMSS
AMSRE	L2P Gridded		FTP	REMSS
SEVIRI	L2P		FTP	Medspiration
MODIS Aqua	L2P		FTP	GDAC
MODIS Terra	L2P		FTP	GDAC

1.5 NASA GDAC Master Metadata Repository and Data Search Services

International Standards Based (FGDC, ISO19115, INSPIRE) Metadata records are available as an on-line resource from the GHRSST-PP Master Metadata Repository (MMR) system. The MMR provides a complete catalogue of all GHRSST-PP compliant data sets.
The US GDAC provides two types of metadata records based on NASA DIF format that are integrated into a relational database:

- Data Set Record (DSD): contains information to all files (i.e., same sensor, data center etc.,) These records are static and are prepared once for each data set.
- File Record (FR): file specific information (e.g., parameter, time and space etc.). These records are dynamic and are prepared on a file-by-file basis by each RDAC.

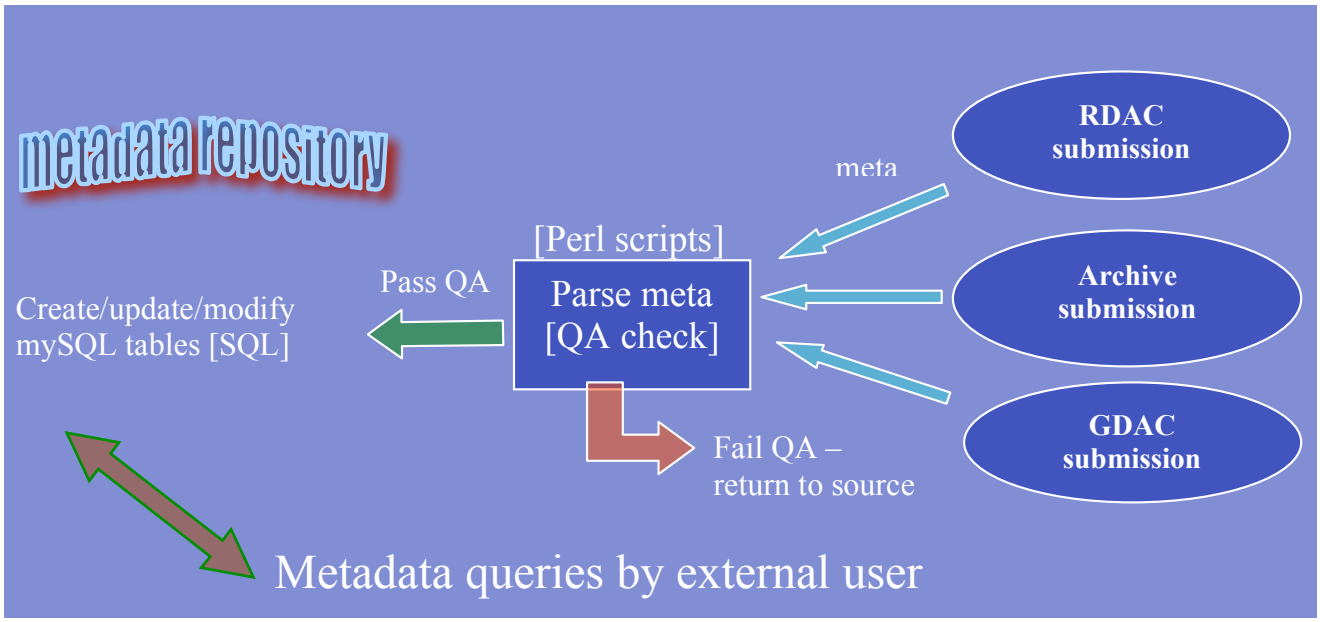

Figure 3: GHRSST-PP Master Metadata Repository Flow Diagram.

1.6 GHRSST_PP US GDAC Application and User Services (AUS)

The goal of the US GDAC AUS is to ensure a high level of customer satisfaction through user advocacy. The AUS follows a GDAC Customer Relationship Management (CRM) Plan, which guides customer support activities. These activities include:

- Facilitate communication of GHRSST-PP data management activities via web, email and professional engagement channels
- Draft and communicate Levels of Service to users and stakeholders to provide consistent support globally
- Communicate metrics and application statistics to stakeholders
- Market data availability to potential data users

- Identify new user communities and application linkages
- Promote feedback mechanisms to ensure customer satisfaction and process improvement

1.7 GHRSST-PP and NASA GDAC Management

The planning, management, implementation and monitoring of all aspects of the GHRSST-PP are the responsibility of the GHRSST-PP Science Team. As stated in the consensus statement of the Ocean Observing System for the 21st Century (Koblinsky and Smith, 2001), the GHRSST-PP Science Team has the implementation oversight for the high resolution SST analysis network component of an integrated global observation strategy. The GHRSST-PP constitutes the first step towards such an integrated system of SST measurements. The Science Team is formed as in international group having a broad experience in all aspects of the GHRSST-PP activities and convenes as lease once per year to review the progress of the project. It plays a particularly important role in the following areas:

1. Reviewing the evolution of GHRSST-PP objectives/goals, maintenance of the GHRSST-PP strategic Plan and, GHRSST-PP Development and Implementation Plan (GDIP), the GHRSST-PP Processing Model (GPM);
2. Coordination of the international consortium that will undertake the development and the implementation of the GHRSST_PP, including its final transition into an operational system;
3. Providing advice and guidance on scientific and technical innovations relevant to the GHRSST_PP;
4. Providing a formal body, that can liaise and interact with national agencies in order to implement the GHRSST-PP.

Additional information regarding the GHRSST-PP Science Team and how to contact members can be found on the Project Office website: http://www.ghrsst-pp.org.

The management of the US GDAC is NASA sponsored via the Jet Propulsion Laboratory. The Principal Investigator, Dr. Jorge Vazquez, is ultimately responsible for the coordination of activities (data management, metadata, search, AUS) within the JPL infrastructure.

2.0 Ocean.US Regional Areas (R.A. Recommendations) DMAC and User Profiles

2.1 Ocean.US DMAC Coordinator

URL	
DMAC Contact	Anne Ball Ocean.US Data Management and Communicaton (DMAC) Specialist 2300 Clrendon Blvd. Suite 1350 Arlington, VA 22201-3667

	Tel: 843.740.1229 Fax: Email: a.ball@ocean.us
Other Contacts	
Description	
SST Requirements	
➢ **Geographic Region/s**	
➢ **Spatial Resolutions**	
➢ **Delivery Timeliness (Hours)**	
➢ **Accuracy**	
➢ **Data Format/s**	
➢ **Preferred Data Access**	
➢ **Additional Informatio n**	

2.2 AOOS - Alaska Ocean Observing System

URL	
DMAC Contact	Rob Cermak AOOS Data Manager University of Alaska Fairbanks Tel: 907-474-7948 Fax: 907-474-7204 Email: cermak@sfos.uaf.edu
Other Contacts	

Description	
SST Requirements	
➢ **Geographic Region/s**	
➢ **Spatial Resolutions**	
➢ **Delivery Timeliness (Hours)**	
➢ **Accuracy**	
➢ **Data Format/s**	
➢ **Preferred Data Access**	
➢ **Additional Informatio n**	

2.3 NANOOS – Northwest Association of Networked Ocean Observing Systems

URL	http://www.nanoos.org/
DMAC Contact	Antonio M. Baptista Professor and Department Head Department of Environmental and Biomolecular Systems OGI School of Science & Engineering Oregon Health & Science University 20000 NW Walker Rd Beaverton, Oregon 97006-8921 Tel: 503-748-1147 Fax: 503-748-1273 Email: baptista@ebs.ogi.edu
Other Contacts	
Description	

SST Requirements	
➢ **Geographic Region/s**	
➢ **Spatial Resolutions**	
➢ **Delivery Timeliness (Hours)**	
➢ **Accuracy**	
➢ **Data Format/s**	
➢ **Preferred Data Access**	
➢ **Additional Informatio n**	

2.4 CeNCOOS – Central & Northern California Ocean Observing System

URL	http://www.cencoos.org/
DMAC Contact	Mark Ignaszewski US Navy Fleet Numerical Meteorology & Oceanography Center Tel: 831-656-4370 Email: mark.ignaszewski@fnmoc.navy.mil
Other Contacts	
Description	
SST Requirements	
➢ **Geographic Region/s**	
➢ **Spatial Resolutions**	
➢ **Delivery Timeliness (Hours)**	

➢ **Accuracy**	
➢ **Data Format/s**	
➢ **Preferred Data Access**	
➢ **Additional Informatio n**	

2.5 SCOOS – Southern California Ocean Observing System

URL	
DMAC Contact	Julie Thomas SCCOOS Data Manager Scripps Institution of Oceanography 9500 Gilman Drive La Jolla, CA 92093 Mail Code 0214 Tel: 858-534-3034 Fax: 858-453-0300 Email: jothomas@ucsd.edu
Other Contacts	
Description	
SST Requirements	
➢ **Geographic Region/s**	
➢ **Spatial Resolutions**	
➢ **Delivery Timeliness (Hours)**	
➢ **Accuracy**	
➢ **Data Format/s**	

➢ **Preferred Data Access**	
➢ **Additional Information**	

2.6 GCOOS – Gulf of Mexico Coastal Ocean Observing System

URL	http://www-ocean.tamu.edu/GCOOS/
DMAC Contact	Dr. Matthew K. Howard Department of Oceanography Texas A&M University 3146 TAMU College Station, Texas 77843-3146 Phone: (979) 862-4169 Fax: (979) 847-8879 Email: mkhoward@tamu.edu
Other Contacts	
Description	
SST Requirements	
➢ **Geographic Region/s**	
➢ **Spatial Resolutions**	
➢ **Delivery Timeliness (Hours)**	
➢ **Accuracy**	
➢ **Data Format/s**	
➢ **Preferred Data Access**	
➢ **Additional Information**	

2.7 SECOORA – Southeast Coastal Ocean Observing Regional Association

URL	http://www.secoora.org/
DMAC Contact	Dr. Dwayne E. Porter Norman J. Arnold School of Public Health and the Baruch Institute University of South Carolina Columbia, SC 29208 Tel: 803-777-4615 Fax: 803-777-8769 Email: porter@sc.edu
Other Contacts	
Description	
SST Requirements	
➢ **Geographic Region/s**	
➢ **Spatial Resolutions**	
➢ **Delivery Timeliness (Hours)**	
➢ **Accuracy**	
➢ **Data Format/s**	
➢ **Preferred Data Access**	
➢ **Additional Information**	

2.8 MACOORA – Mid-Atlantic Coastal Ocean Observing Regional Association

URL	http://www.macoora.org/
DMAC Contact	Larry Atkinson Department of Ocean, Earth and Atmospheric Sciences Old Dominion University Norfolk, VA 23505 Tel: 757 683 3472 Fax: 757 683 5303 Email: atkinson@ccpo.odu.edu
Other Contacts	
Description	
SST Requirements	
➢ **Geographic Region/s**	
➢ **Spatial Resolutions**	
➢ **Delivery Timeliness (Hours)**	
➢ **Accuracy**	
➢ **Data Format/s**	
➢ **Preferred Data Access**	
➢ **Additional Information**	

2.9 GoMOOS – Gulf of Main Ocean Observing System

URL	http://www.gomoos.org/
DMAC Contact	Phil Bogden, CEO 350 Commercial Street Portland, ME 04112 Tel: 207-772-0423

	Email: bogden@gomoos.org
Other Contacts	
Description	
SST Requirements	
➢ **Geographic Region/s**	
➢ **Spatial Resolutions**	
➢ **Delivery Timeliness (Hours)**	
➢ **Accuracy**	
➢ **Data Format/s**	
➢ **Preferred Data Access**	
➢ **Additional Informatio n**	

2.10 PacIOOS – Pacific Islands Integrated Ocean Observing System

URL	http://research.eastwestcenter.org/PacIOOS/
DMAC Contact	Eileen Shea Climate Projects Coordinator Address: East West Center 1601 East-West Road, JAB Room 2062 Honolulu, HI 96848-1601 Phone: 808-944-7253 Fax: 808-944-7298 Email: SheaE@EastWestCenter.org
Other Contacts	
Description	
SST Requirements	
➢ **Geographic Region/s**	

➢ **Spatial Resolutions**	
➢ **Delivery Timeliness (Hours)**	
➢ **Accuracy**	
➢ **Data Format/s**	
➢ **Preferred Data Access**	
➢ **Additional Informatio n**	

2.11 Caribbean Region

URL	N/A
DMAC Contact	
Other Contacts	
Description	
SST Requirements	
➢ **Geographic Region/s**	
➢ **Spatial Resolutions**	
➢ **Delivery Timeliness (Hours)**	
➢ **Accuracy**	
➢ **Data Format/s**	
➢ **Preferred Data Access**	
➢ **Additional**	

Information	